ISS and Human Research Project Office Highlights
January 15, 2010

ISS Research Program

Technical Review Board Held for CFE-2

A Technical Review Board (TRB) was held on January 7, 2010 for the Capillary Flow Experiments-2 (CFE-2) flight experiment. The purpose of this review was to assess the go-forward plan of the project team to resolve an issue of crazing along the bond plane surrounding the transport tubes in the CFE-2 Interior Corner Flow (ICF) test vessels.

The project presented a background and overview of the crazing issue and a test plan to determine the root cause by fabricating sets of acrylic sample blocks to investigate several variables including section thickness, drilling holes pre vs. post-bonding, and variations in annealing profiles. The TRB panel discussed the testing plan and repair options that could potentially have less impact to the development schedule. The panel plans to provide the team with a set of recommendations within a few weeks.

The CFE-2 flight experiment consist of 11 handheld experiment test vessels with various test geometries to investigate the behavior of capillary flow phenomena in geometries found in capillary vanes, screens, and wicking structures. The working fluid is silicone oil of various viscosities, depending on the individual unit geometry. The results of CFE-2 have applications in propellant management for fluid storage tanks, thermal control systems, and advanced life support systems for spacecraft. The Principal Investigator for CFE-2 is Prof. Mark Weislogel at Portland State University.

The CFE-2 flight experiment is funded by the Exploration Technology Development Program (ETDP) under the ISS Research Project. Four CFE-2 flight units, without the crazing transfer tube issue, have been shipped to Kennedy Space Center (KSC) on December 14, 2009 for launch on Flight 19A (STS-131) in March 18, 2010. (POC:MAH/Donna Bohman, (216) 433-8860)

24th Gravity Related Phenomena in Space Exploration research and Technology of AIAA Aerospace Science meeting attended by ISS Program Manager.

The 24th Gravity-Related Phenomena in Space Exploration Research and Technology (GPSE) Was Part of the 48th AIAA Aerospace Sciences Meeting (ASM) in Orlando, FL from January 4-7, 2010 The 24th Symposium on Gravity-Related Phenomena in Space Exploration Research and Technology (GPSE) was held at the 48th AIAA Aerospace Sciences Meeting (ASM) in Orlando, FL from January 4-7, 2010. Kurt Sacksteder, Steven Collicott (Purdue University), Fred Kohl and Henry Nahra of GRC organized the symposium to actively explore scientific and technological possibilities of reduced-gravity scientific research and technology enabling space exploration. Seven GPSE sessions and 41 individual presentations covering several aspects of the Exploration Systems Advanced Capabilities program and associated gravity-related science and technology, with emphasis on the Exploration Technology Development Program (ETDP). Two sessions featured top-level overviews of Advanced Capabilities Division (ACD) and its subsidiary projects, International Space Station (ISS) as a National Laboratory, the Innovative Partnership Program Office (IPP), and programmatic overviews from several ISS international

partner agencies. Another session highlighted recent and ongoing experiment operations on the International Space Station, mostly GRC experiments. Fred Kohl, Kurt Sacksteder and Henry Nahra, GRC, and Fran Chiaramonte, HQ, chaired sessions, all of which were well attended. A separate session, a "Town Hall Meeting" was hosted by the NRC Decadal Study on Biological and Physical Sciences. Additionally, a meeting of the AIAA Microgravity and Space Processes Technical Committee (MSPTC) Meeting was held during the symposium to continue the organization of the next ASM meeting, the 25th MSSP/GPSE Symposium, to be held in Orlando, FL, in January 2011, and to continue work toward broadening the scope of the committee's purview to include technology development in addition to the traditional focus on fundamental research. The recently reconstituted AIAA Space Station Program Committee, chaired by Jacob Cohen, ARC, also held it's first organizational meeting. The ETDP content was highlighted in the NASA exhibit with a DVD presentation and several roll-up posters; the content was assembled by Fred Kohl, Rich Rinehart and Kimberly Land, LaRC. (POC: REC/Kurt Sacksteder, (216) 433-2857, DEF/Henry Nahra, (216) 433-5385 and MAH/Fred Kohl, (216) 433-2866).

Abstracts Submitted to the 2010 National Space & Missile Materials Symposium (2010 NSMMS)

Six Glenn Materials International Space Station Experiment (MISSE) flight experiment related abstracts have been submitted to the MISSE Session of the 2010 NSMMS from the Space Environment and Experiments Branch (RES). Two of the papers are invited. The submitted abstracts are:

- "Evaluation of Optical Properties and Atomic Oxygen Erosion Yields of Polymer Film Materials Exposed to the Space Environment on MISSE 3 & 4" by Joyce Dever, Deborah Waters, Kim de Groh and Quang-Viet Nguyen
- "MISSE 3 and 4 Tensile Test Analysis from the Polymer Film Thermal Control and Gossamer Materials Experiments" by Deborah Waters, Sharon Miller and Joyce Dever
- "MISSE 6 Atomic Oxygen Fluence Monitor Experiment" by Bruce Banks and Sharon Miller
- "MISSE 6 Polymer Film Tensile Experiment" by Sharon Miller, Joyce Dever, Deborah Waters and Bruce Banks
- "MISSE 6 PEACE Polymers Atomic Oxygen Erosion Data " by Kim de Groh, Bruce Banks, Aobo Guo, Claire Ashmead, Gianna Mitchell and Grace Yi
- "Optical Property Evaluation of Next Generation Thermal Control Coatings" by Donald Jaworske and Mukund Deshpande.

The 2010 NSMMS will be held in Scottsdale, AZ from June 28 – July 2, 1020. This work is supported by the ISS Research Project (POC: RES/Kim de Groh, (216) 433-2297 and RES/Donald Jaworske, (216) 433-2312)

<u>Human Research Program</u>

Two Glenn Harnesses tested on ISS to be returned on 19A.

Return Manifest Request was approved for 19A for return of first two Glenn Harnesses tested by crewmembers on ISS during Expedition 21 in the Harness Station Development Test Objective (SDTO). The units will be returned for inspection of wear after use. Manifest Request is in for ULF4 for the 6th and 7th of 7 Glenn Harnesses to be flown, these units were delivered to JSC in December 2009. The balance of Glenn Harnesses are on-orbit and are either currently in use or

will be used during Expedition 22/23. The SDTO is expected to be completed during Expedition 24/25. (POC: MAH/Gail Perusek, (216) 433-8729)